

SECTION 05 51 00

METAL STAIRS

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Concrete Pan-filled Stairs.
- B. Industrial Type Stairs.
- C. Safety Tread Stairs.
- D. Railing System.

1.02 RELATED SECTIONS

- A. Railings not directly related to metal stairs are specified in Section 05 52 00, Metal Railings.
- B. Stainless steel handrails and railings are specified in Section 05 70 00, Decorative Metal.
- C. For stair nosings, see Section 05 50 00, Metal Fabrications.

1.03 MEASUREMENT AND PAYMENT

- A. Measurement
 - 1. Metal stairs and related railings and handrails will be measured for payment by the lump-sum method, acceptably fabricated and installed. Top, bottom, and intermediate landings, and supporting steel will be included in the lump-sum measurement.
 - 2. Accessories, shop painting and field touchup, concrete, anchorage and grouting will not be measured separately for payment; such items will be considered incidental to the metal stairs installation.
- B. Payment: Metal stairs and related railings and handrails will be paid for at the Contract lump-sum price as indicated in the Bid Schedule of the Bid Form.

1.04 REFERENCES

- A. American Concrete Institute (ACI):
 - 1. ACI 117 Specifications for Tolerances for Concrete Construction and Materials and Commentary
 - 2. ACI 301 Specifications for Structural Concrete

B. American Society for Testing and Materials (ASTM):

- | | |
|----------------------|--|
| 1. ASTM A36/A36M | Standard Specification for Carbon Structural Steel |
| 2. ASTM A53/A53M | Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless |
| 3. ASTM A123/A123M | Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products |
| 4. ASTM A153/A153M | Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware |
| 5. ASTM A307 | Standard Specification for Carbon Steel Bolts, Studs and Threaded Rod, 60,000 psi Tensile Strength |
| 6. ASTM A500/A500M | Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes |
| 7. ASTM A501/A501M | Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing |
| 8. ASTM A1008/A1008M | Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low Alloy, High-Strength Low Alloy with Improved Formability, Solution Hardened, and Bake Hardenable |
| 9. ASTM A1011/A1011M | Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with improved Formability, and Ultra-High Strength |
| 10. ASTM C33/C33M | Standard Specification for Concrete Aggregates |

C. The Society for Protective Coatings (SSPC):

- | | |
|--------------------------|-----------------------------------|
| 1. SSPC-SP 1 | Solvent Cleaning |
| 2. SSPC-SP 3 | Power Tool Cleaning |
| 3. SSPC-SP 10/NACE No. 2 | Near-White Blast Cleaning |
| 4. SSPC-SP 11 | Power Tool Cleaning to Bare Metal |

1.05 SUBMITTALS

- A. General: Refer to Section 01 33 00, Submittal Procedures, and Section 01 33 23, Shop Drawings, Product Data, and Samples, for submittal requirements and procedures.

- B. Stair Design: Stairs shall be designed and engineered by the manufacturer, incorporating specified criteria, and employing a professional civil or structural engineer currently registered in the State of California to perform the design engineering. Include design data along with Shop Drawings. Drawings and design data shall be stamped and signed by the manufacturer's professional engineer.
- C. Shop Drawings: Submit fully detailed Shop Drawings of metal stairs and railings, showing sizes, details of fabrication and construction, methods of assembly, handrail brackets, locations of hardware, anchors, and accessories, and installation details.
- D. Product Data: Submit manufacturer's product data of stair type and corrosion-inhibitive finish system. Include patterned or embossed treads, safety coated treads, railing system, handrails, and handrail brackets.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Type and Manufacture: Provide steel stairs of the following types as indicated:
 - 1. Concrete Pan-Filled Stairs: Steel pan-type stairs with concrete-filled treads and landings, and with treads, risers, and platforms constructed of structural steel sheet. Treads shall have nosings.
 - 2. Industrial Type Stairs: Steel stairs with tread fabricated from checkered or diamond-pattern steel plate or sheet, or with treads fabricated from button-embossed structural steel sheet. Risers shall be closed, fabricated from steel sheet.
 - 3. Safety Tread Stairs: Steel stairs with formed steel treads and platforms, coated with anti-skid safety surface, and closed steel sheet risers.
 - 4. Railing System: All stairs shall be provided with a complete stair railing system, including handrails and handrail brackets at walls, fabricated from steel pipe.
- B. Stringers and Supporting Steel:
 - 1. Structural Shapes: Standard structural sections, as indicated, conforming to ASTM A36/A36M.
 - 2. Structural Tubing: Welded or seamless steel tubing, conforming to ASTM A500/A500M or ASTM A501/A501M (minimum yield point of 33,000 psi), of size and shape indicated.
- C. Treads and Risers, Platforms and Landings:
 - 1. Steel Sheet: Treads, risers, and platforms shall be fabricated from structural steel sheet, of gage or thickness indicated, conforming with ASTM A1011/A1011M or ASTM A1008/A1008M, with minimum yield point of 33,000

psi, formed as indicated. When gage is not indicated, provide 14 gage steel sheet.

2. Patterned Steel Plate: Treads and platforms for industrial-type closed-riser stairs shall be commercial quality checkered or diamond-pattern steel plate or structural steel sheet of thickness indicated, formed to shape and configuration indicated. Risers shall be steel sheet as specified above. Treads and platforms shall be hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.
 - a. Button-Embossed Steel Sheet: Treads and platforms may be fabricated from button-embossed structural steel sheet of minimum 12 gage thickness, with punched circular holes at apex of buttons for nonslip effect, and punched circular holes between buttons for drainage. Buttons shall be spaced 5/8 inch on centers. Drainage holes shall be spaced 1-1/4 inches on centers, eliminating the buttons at these locations. Hole size for button holes shall be 1/8-inch diameter, plus or minus 1/32 inch. Hole size for drainage holes shall be 1/4-inch diameter, plus or minus 1/16 inch. Treads and platforms shall be hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.
3. Safety Coated Treads: Formed steel sheet coated with anti-skid or nonslip encapsulated aluminum oxide material bonded or fused to the steel surface. Submit product data and sample for approval.

D. Railings and Handrails:

1. Pipe: Pipe for railings, pipe supports, and handrails shall be seamless steel pipe conforming to ASTM A53/A53M, Type S, Grade A, with special instructions to the manufacturer to provide Architectural Handrail Grade, of diameters and sizes indicated.
2. Handrail Brackets: Provide handrail brackets for handrails at walls, manufactured specifically for the purpose of cast, forged, or wrought steel, of configuration indicated or required to suit conditions, galvanized after fabrication.

E. Welding Rod/Electrodes: Refer to Section 05 05 22, Metal Welding, for requirements.

F. Anchors, Fasteners, and Accessories: Provide all required anchors, fasteners, miscellaneous components, and accessories as required for a complete and finished stair installation. Bolts, nuts, and washers shall conform with ASTM A307, galvanized in accordance with ASTM A153/A153M.

1. Expansion Bolts: Where anchors are not cast into the concrete construction, provide galvanized expansion type anchors with matching galvanized steel bolts or studs with nuts, of sizes as indicated or required. Provide washers under all bolt heads and nuts. Expansion bolts require approval of the Engineer before they may be installed in post-tensioned slabs. Expansion bolts will not be permitted for use on concrete curbs or along the edge of concrete or a concrete joint.

G. Paint: Corrosion-inhibitive protective primer as specified in Article 2.04 herein.

- H. Grout: Refer to Section 03 61 11, Non-Shrink Grout, for requirements.

2.02 FABRICATION

- A. Metal stairs and railings shall be fabricated by firms or shops experienced and skilled in the construction of metal stairs and architectural railings. There shall be no exposed screws, bolts, and fasteners in the finished work.
- B. For items bearing on concrete, provide steel bearing plates and anchors as indicated or required. Base or bearing plates shall be leveled by means of adjustment nuts. The space below plates shall be packed solid with full bed of non-shrink grout. Templates shall be furnished, together with instructions for setting of anchors, anchor bolts, and bearing plates. The Contractor shall supervise and ensure that anchors and related items are properly set in concrete during the progress of the work.
- C. Welded connections shall be made in accordance with applicable requirements of Section 05 05 22, Welding. Welding shall be performed in the shop, unless otherwise indicated. Welds where exposed to view shall be ground down and dressed smooth, so that the shape and profile of the item welded are maintained.
- D. Holes shall be cut, drilled, or punched at right angles to the surface of the metal and shall not be made or enlarged by burning. Holes in base or bearing plates shall be drilled. Holes shall be provided in members as required to permit connecting the work of other trades.
- E. Metal stairs and railings shall be prefabricated and preassembled in the factory or shop as far as practicable.

2.03 GALVANIZING

- A. Where certain components are indicated to be galvanized, comply with galvanizing requirements of Section 05 50 00, Metal Fabrications.

2.04 CLEANING AND PAINTING

- A. Cleaning and painting shall conform to like requirements specified in Section 05 12 00, Structural Steel Framing.
- B. All surfaces of metal stairs and railings, including surfaces of pan-filled stairs, shall be cleaned and treated to assure maximum paint adherence, prior to application of the shop prime coat, in accordance with SSPC-SP 1, SSPC-SP 3, SSPC-SP 10/NACE No. 2, and SSPC-SP 11 as applicable for the exposure and application.
- C. Ferrous metalwork shall be given a shop coat of rust-inhibitive metal primer as specified in Section 05 12 00, Structural Steel Framing, or other approved rust-inhibitive metal primer standard with the stair manufacturer. All surfaces of stairwork and railings shall be spray-painted.
- D. Where galvanized surfaces are indicated to be painted, comply with cleaning and painting requirements of Section 05 50 00, Metal Fabrications.

- E. Coordinate with Section 09 91 00, Painting, for compatibility of the prime coat and finish coats of paint.

2.05 CONCRETE

- A. Concrete for pan-filled stair treads and landings shall be concrete, weighing not less than 120 pounds per cubic foot, with a minimum compressive strength at 28 days of 4,000 psi. Maximum aggregate size shall be 3/8 inch (ASTM C33/C33M, Size No. 8). Include a mix of aluminum oxide and silicone carbide grit particles as required to produce non-slip tread surfaces.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Stairs and railings shall be installed by the manufacturer or its authorized representative as indicated and in accordance with the approved Shop Drawings and the manufacturer's installation instructions. Stairs and railings shall be installed with all accessories furnished by the manufacturer or fabricator as required for complete and finished stair installations.
- B. Installation of stair work shall be true and horizontal or perpendicular as the case may be, level and square, with angles and edges parallel with related lines of the building or structure.
- C. Shop fabricated items subject to damage shall be braced and carefully handled to prevent distortions or other damage.
- D. Field welding, where required, shall conform with requirements specified for shop fabrication.
- E. Bearing plates shall be supported at the proper level by means of adjustment nuts on anchor bolts. Bases and plates shall be set accurately using a high-strength, non-shrink grouting mortar to obtain uniform bearing.

3.02 FIELD PAINTING

- A. After installation, exposed painted surfaces, field welds, and other abraded or damaged primed surfaces shall be touched up with an additional coat of the same primer for ferrous surfaces as herein before specified for shop painting. Spray paint all touch-up work.
- B. Finish field painting is specified in Section 09 91 00, Painting.

3.03 CONCRETE WORK

- A. Concrete for pan-filled stairs shall be placed, compacted, finished, and cured in accordance with applicable requirements of ACI 301.

- B. Treads and landings shall receive a “troweled finish” in combination with a “nonslip finish” with “very flat” tolerances as specified in ACI 301 and ACI 117.

END OF SECTION 05 51 00